

Application No.: 10/738,421
Amendment Dated: November 9, 2006
Reply to Office Action of: August 11, 2006

MTS-3490US

Amendments to the Drawings:

The attached sheet of drawing includes changes to Figure 5. This sheet replaces the original sheet.

Remarks/Arguments:

Claims 1, 3, 4 and 21 have been amended. No new matter has been introduced herein. Claim 6 has been cancelled. Claims 1-5 and 7-21 are pending.

The drawings have been objected to. Namely, the box "Bias" does not include the label "308," as it is referred to in the specification on page 36. Fig. 5 has been amended accordingly. Applicants respectfully request that the objection to the drawings be withdrawn.

Claims 1, 3, 7, 9, 11, 17-19 and 21 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Tikka et al. (U.S. 2003/0060170). It is respectfully submitted, however, that these claims are patentable over the cited art for the reasons set forth below.

Claims 1, as amended, includes features neither disclosed nor suggested by the cited art, namely:

... a duplexer, connected to said antenna and having a single-phase input terminal and a balanced output terminal, of conveying said transmitting signal inputted to said single-phase input terminal ... outputting a receiving signal ... substantially as a differential signal from said balanced output terminal and outputting a part of said transmitting signal as an in-phase signal from said balanced output terminal ...

... a receiving apparatus connected to said balanced output terminal and having a circuit in which a gain of a signal of a differential component is higher than that of a signal of an in-phase component, or a loss of the signal of the differential component is lower than that of the signal of the in-phase component ...
(Emphasis Added)

Claims 3 and 21 include similar recitations. These features are disclosed, for example, at page 30, line 1 - page 31, line 17; and Fig. 2.

Tikka et al. disclose, in Fig. 4, a duplexer 100 connected to balanced antennas 62 and 64 and having balanced port 110 and balanced port 130 connected to respective first and second transceivers 52 and 54. Transceivers 52 and 54 can be a transmitter and a receiver (paragraph 51). In Fig. 5, Tikka et al. disclose a duplexer 102 connected to a single-ended antenna 66 and having balanced ports 110 and 130 (paragraph 53). Furthermore, Tikka et al. disclose, in Fig. 6, a duplexer 104 connected to a single-ended antenna 66 and single-ended ports 115 and 135 (paragraph 54).

Tikka et al. do not disclose or suggest Applicants' claims features of "a duplexer ... having a single-phase input terminal and a balanced output terminal" where the duplexer "conveys said transmitting signal to said single-phase input terminal ... outputting a receiving signal substantially as a differential signal from said balanced output terminal and outputting a part of said transmitting signal as an in-phase signal from said balanced output terminal" or "a receiving apparatus connected to said balanced output terminal and having a circuit in which a gain of a signal of a differential component is higher than that of a signal of an in-phase component, or a loss of a signal of the differential component is lower than that of the signal of the in-phase component" (Emphasis Added). These features are neither disclosed nor suggested by Tikka et al. Although Tikka et al. disclose a duplexer that includes a balanced input from a transmitter 52 and a balanced output to a receiver 54 (Fig. 4 and paragraph 51), Tikka et al. are silent on a duplexer that is connected to an antenna and has a single-phase input terminal and a balanced output terminal. Tikka et al. are silent on the duplexer outputting a part of the transmitting signal as an in-phase signal from the balanced output terminal. Tikka et al. are also silent on a receiving apparatus connected to the balanced output terminal of the duplexer that

includes a circuit that causes a gain of a differential component to be higher than that of an in-phase component or a loss of the differential component to be lower than that of the in-phase component. These features are neither disclosed nor suggested by Tikka et al.

Applicants' invention, as recited by claim 1, includes an advantage that is not provided by the filtering system of Tikka et al., namely, the receiving apparatus is used in order to reduce a gain of a portion of the transmitting signal that is leaked from the duplexer to the receiving apparatus (the in-phase component) as compared with a gain of the receiving signal (the differential component). As discussed in Applicants' specification, on page 31, lines 3-17, the level of the transmitting signal leak from the duplexer, when not suppressed by the duplexer, is significantly higher than that of the receiving apparatus. Thus, in the conventional radio communication apparatus, if the receiving signal is amplified, the transmitting signal leak is also amplified so that a low noise amplifier or a down mixer in the receiving apparatus becomes saturated. In contrast, in the subject invention, it is possible to increase only the receiving signal so as to reduce saturation of the amplifier or down mixer of the receiving apparatus. Thus, Tikka et al. do not disclose or suggest the features or the advantages of the subject invention, as recited by claim 1. Accordingly, allowance of claim 1 is respectfully requested.

Amended claim 3 and 21, although not identical to claim 1, includes features similar to claim 1 that are neither disclosed nor suggested by the cited art. Namely, a duplexer that 1) conveys a transmitting signal to a single-phase input terminal to an antenna, 2) outputs a receiving signal to a balanced output terminal and 3) outputs a part of the transmitting signal as an in-phase signal from the balanced

output terminal, and a receiving apparatus in which a gain of a differential component is higher than an in-phase component or a loss of the differential component is lower than the in-phase component. As discussed above, these features are neither disclosed nor suggested by Tikka et al. Thus, Tikka et al. do not include all of the features of claims 3 and 21. Accordingly, allowance of claims 3 and 21 is respectfully requested.

The rejection of claims 7 and 9 is respectfully traversed for the reasons set forth below. Claim 7 includes features neither disclosed nor suggested by the cited art, namely:

... a duplexer, connected to said antenna and having a balanced input terminal and a single-phase output terminal, of conveying said transmitting signal inputted to said balanced input terminal ... and outputting a single-phase receiving signal ... to said single-phase output terminal ... (Emphasis Added)

Claim 9 includes features neither disclosed nor suggested by the cited art, namely:

... a duplexer, connected to said one antenna and said another antenna and having a balanced input terminal and a single-phase output terminal, of conveying said transmitting signal inputted to said balanced input terminal ... and outputting a receiving signal ... as a single-phase signal to said single-phase output terminal ... (Emphasis Added)

Tikka et al. is discussed above. Tikka et al. do not disclose nor suggest Applicants' claimed features of "a duplexer, connected to said antenna and having a balanced input terminal and a single-phase output terminal" (Emphasis Added), as recited in claim 7. Claim 9 includes a similar recitation. As discussed above, Tikka et al. are silent on a duplexer that is connected to an antenna or one and another antennas and has a balanced input terminal and a single-phase output terminal.

Thus, Tikka et al. do not include all of the features of claims 7 and 9. Accordingly, allowance of claims 7 and 9 is respectfully requested.

The rejection of claim 11 is respectfully traversed. Claim 11 includes features neither disclosed nor suggested by the cited art, namely:

... a duplexer, connected to said one antenna and said another antenna and having a balanced input terminal and a balanced output terminal, of conveying said transmitting signal inputted to said balanced input terminal ... and outputting a receiving signal ... as the differential signal to said balanced output terminal, and outputting a part of said transmitting signal substantially as an in-phase signal to said balanced output terminal ...

... a receiving apparatus connected to said balanced output terminal and having a circuit in which a gain of a signal of a differential component is higher than that of a signal of an in-phase component, or a loss of the signal of the differential component is lower than that of the signal of the in-phase component ... (Emphasis Added)

Tikka et al. is discussed above. Tikka et al. do not disclosed nor suggest "a duplexer ... outputting a receiving signal ... as the differential signal to said balanced output terminal, and outputting a part of said transmitting signal substantially as an in-phase signal to said balanced output terminal" or "a receiving apparatus connected to said balanced output terminal ... a gain ... of a differential component is higher than that of ... an in-phase component, or a loss of ... the differential component is lower than that of the ... in-phase component" (Emphasis Added). These features are neither disclosed nor suggested by Tikka et al. Thus, Tikka et al. do not include all of the features of claim 11. Accordingly, allowance of claim 11 is respectfully requested.

The rejection of claim 17 is respectfully traversed. Claim 17 includes features neither disclosed nor suggested by the cited art, namely:

... a duplexer, connected to said antenna apparatus and having a single-phase input terminal and a balanced output terminal, of conveying said transmitting signal inputted to said single-phase input terminal ... and outputting a receiving signal ... from said balanced output terminal ...

... said duplexer has an impedance for a differential signal in a frequency band of said receiving signal higher than the impedance for a single-phase signal in the frequency band of said transmitting signal ... (Emphasis Added)

Tikka et al. is discussed above, Tikka et al. do not disclose or suggest Applicants' claimed features of "a duplexer, connected to said antenna apparatus and having a single-phase input terminal and a balanced output terminal" where "said duplexer has an impedance for a differential signal ... of said receiving signal higher than the impedance for a single-phase signal ... of said transmitting signal" (Emphasis Added). Tikka et al. are silent regarding a duplexer having a single-phase input terminal and a balanced output terminal. Although Tikka et al. disclose, in paragraph 52, that the first passband filter 10 and second passband filter 10' of duplexer 100 can have different passband frequencies, Tikka et al. are silent on a duplexer that has an impedance for a differential signal of the receiving signal higher than the impedance for a single-phase signal of the transmitting signal. Thus, Tikka et al. do not include all of the features of claim 17. Accordingly, allowance of claim 17 is respectfully requested.

Claims 18 and 19 include all of the features of claim 17 from which they depend. Accordingly, claims 18 and 19 are also patentable over the cited art.

Claims 4-6 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tikka et al. in view of McCarthy et al. (U.S. 2004/0056819). Claim 6 has been cancelled. It is respectfully submitted, however, that the

remaining claims are now patentable over the cited art for the reasons set forth below.

Claim 4, as amended, includes features neither disclosed nor suggested by the cited art, namely:

... a duplexer, connected to said one antenna and said another antenna and having a single-phase input terminal and a balanced output terminal, of conveying said transmitting signal inputted to said single-phase input terminal ... outputting a receiving signal ... substantially as a differential signal from said balanced output terminal and outputting a part of said transmitting signal as an in-phase signal from said balanced output terminal ...

... a receiving apparatus connected to said balanced output terminal and having a circuit in which a gain of a signal of a differential component is higher than that of a signal of an in-phase component, or a loss of the signal of the differential component is lower than that of the signal of the in-phase component ... (Emphasis Added)

These features are disclosed, for example, at page 51, line 1 - page 52, line 14 ; and Fig. 13.

Tikka et al. is discussed above. Tikka et al. do not disclose nor suggest Applicants' claimed features of "a duplexer ... having a single-phase input terminal and a balanced output terminal ... outputting a receiving signal ... from said balanced output terminal and outputting a part of said transmitting signal as an in-phase signal from said balanced output terminal" or "a receiving apparatus connected to said balanced output terminal ... a gain ... of a differential component is higher than that of ... an in-phase component, or a loss of a ... the differential component is lower than that of ... the in-phase component" (Emphasis Added). As discussed above, Tikka et al. is silent regarding these features.

McCarthy et al. disclose, in Fig. 2, a hybrid coupler having a feed port 50, a 0° port 57 and a -180° hybrid port 58 (paragraph 20). McCarthy et al., however, do not make up for the features that are lacking in Tikka et al. Namely, a duplexer having a single-phase input terminal and a balanced output terminal and that outputs a part of the transmitting signal as an in-phase signal from the balanced output terminal or a receiving apparatus connected to the balanced output terminal that has a circuit in which a gain of the differential component is higher than that of an in-phase component or a loss of the differential component is lower than that of the in-phase component. Accordingly, allowance of claim 4 is respectfully requested.

Claim 5 includes all of the features of claim 4 from which it depends. Accordingly, claim 5 is also patentable over the cited art.

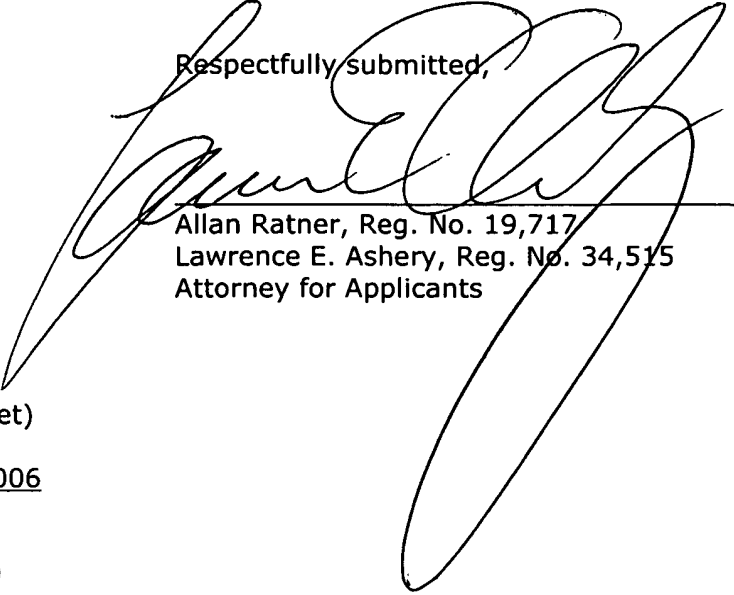
Applicants acknowledge with appreciation the Examiner's finding that claims 2, 8, 10, 12-16 and 20 include allowable subject matter if rewritten into independent form, including all the limitations of the base claim and any intervening claims. However, there is no need to amend these claims because they are dependent on claims which are in condition for allowance for the reasons set forth above.

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In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance, which action is respectfully requested.

Respectfully submitted,



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DMG/fp

Attachment: Figure 5 (1 sheet)

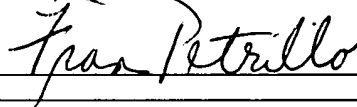
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